Date: Tue, 8 Feb 94 04:30:40 PST
From: Ham-Equip Mailing List and Newsgroup <ham-equip@ucsd.edu>
Errors-To: Ham-Equip-Errors@UCSD.Edu
Reply-To: Ham-Equip@UCSD.Edu
Precedence: Bulk
Subject: Ham-Equip Digest V94 #25
To: Ham-Equip

Ham-Equip Digest   Tue, 8 Feb 94   Volume 94 : Issue   25

Today's Topics:

Send Replies or notes for publication to: <Ham-Equip@UCSD.Edu>
Send subscription requests to: <Ham-Equip-REQUEST@UCSD.Edu>
Problems you can't solve otherwise to brian@ucsd.edu.

Archives of past issues of the Ham-Equip Digest are available
(by FTP only) from UCSD.Edu in directory "mailarchives/ham-equip".

We trust that readers are intelligent enough to realize that all text
herein consists of personal comments and does not represent the official
policies or positions of any party. Your mileage may vary. So there.

Date: 7 Feb 1994 03:42:28 GMT
From: agate!spool.mu.edu!news.nd.edu!mac31@network.ucsd.edu
Subject: DSP Audio Filters
To: ham-equip@ucsd.edu

I think I followed most of the recent discussion on DSP audio filters and how they compare to/work alongside IF filters. But I don't believe there was much comparison of different designs and different models of DSP devices. Is there any particular advantage of the Timewave products over JPS or any other manufacturer? Are the less expensive models (e.g., the DSP-9) significantly less effective than the pricier ones (e.g., the DSP-59)?

Date: Mon, 7 Feb 1994 02:19:09 GMT
From: boulder!cnsnews!spot.Colorado.EDU!millerpe@uunet.uu.net
Subject: Looking for Mods for The Kenwood TH-22AT

To: ham-equip@ucsd.edu

I am looking for any mods for the fairly new
Kenwood TH-22AT HT. Any help would be
appreciated.

Thanx
Peter Miller
--
===
Peter M. Miller   Home: 303-494-6990
Computing and Network Services - Small Systems   Work: 303-492-4866
University of Colorado - Boulder   millerpe@spot.colorado.edu

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Date: 6 Feb 1994 21:08:33 GMT
From: pacbell.com!sgiblab!sdd.hp.com!math.ohio-state.edu!howland.reston.ans.net!EU.net!uknet!bhamcs!news@network.ucsd.edu
Subject: TEMPEST - Electronic Eavesdropping
To: ham-equip@ucsd.edu

Transient Electromagnetic Pulse Emanation Standard (TEMPEST) is the US standard defining the amount of electromagnetic radiation that a device may emit without compromising the information it is processing.

In the US it not illegal to posess TEMPEST-surveillance equipment but it is illegal to take appropriate counter-measures to prevent surveillance. The US government has refused to release details of its TEMPEST research and has restricted the dissemination of independent research by classifying it.

The US Drug Enforcement Agency (DEA) makes use of TEMPEST secured electronics and computers as they believe that the drug cartels may possess surveillance equipment.

I am interested in gathering comments on the social, legal, ethical, and technical aspects of use of TEMPEST surveillance equipment in the US and Europe with the aim of including it in a discussion of the threats to computer/digital systems.

Please reply by E-mail. I will provide a summary to anybody who requests one.

thanks, - Rob Jackson

(more information on TEMPEST can be found in the paper
"Eavesdropping On the Electromagnetic Emanations of Digital
Equipment: The Laws of Canada, England, and the US" by
Cristopher Seline - available on FTP from csrc.ncsl.nist.gov)

Date: Thu, 3 Feb 1994 13:13:56 GMT
From: mvb.saic.com!unogate!news.service.uci.edu!usc!howland.reston.ans.net!newsserver.jvnc.net!news.cac.psu.edu!news.pop.psu.edu!ra!usenet@network.ucsd.edu
Subject: Through-the-glass antennas
To: ham-equip@ucsd.edu

This past year I bought a new car, a 1993 Saturn. I want to install a 2-meter through-the-glass antenna on the rear window. However, I noticed that the top of the window is tinted opaque black. Question: is this tinting metallic or otherwise conductive? If it is, then I guess a though-the-glass antenna is out of the question. Anybody know anything about this?

Dave
--
David Drumheller, KA3QBQ phone: (202) 767-3524
Acoustics Division, Code 7140 fax: (202) 404-7732
Naval Research Laboratory
Washington, DC 20375-5350 e-mail: drumhell@claudette.nrl.navy.mil

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Date: 7 Feb 1994 19:49:03 GMT
From: dog.ee.lbl.gov!agate!violet.berkeley.edu!mtrail@network.ucsd.edu
Subject: Tried MFJ 20 meter SSB?
To: ham-equip@ucsd.edu

Has anyone seen or tried MFJ's 12 watt 20 meter SSB rig shown in their 1994 catalogue? Is it even in production yet?
Matt Trail KN6CR

Date: (null)
From: (null)
>Let me state it again...for vertical antennas, a half wave vertical has more
>gain than a quarter wave vertical, a 5/8 wave has more gain still, a 3/4 wave
>has more yet, and so on...But how does the gain change if fed from the center
>or off center like a Zepp (don't I remember something about them having a gain
>of 1.66 over a dipole or something like that...probably wrong).

Feedpoint location is irrelevant for pattern calculations of halfwave
radiators, that's strictly a matching issue. (In practice, different
matching systems can impact antenna *system efficiency*, but that's
a separate issue. The relevant formula for vertical radiator field
strength at a given angle from the vertical is

```
E=((60*I)/(D*sin(2*pi*h/L))*
                      ((cos((2*pi*h/L)*cos(phi)))-(cos(2*pi*h/L))/sin(phi))
```

Where E is field intensity in mV/m,
I is antenna base current in amperes
h is length of antenna in meters
L is wavelength in meters
D is distance from the antenna is kilometers,
Phi is the angle from the vertical of the radiation

If you run this equation for a family of antenna lengths, you'll find
that maximum radiation perpendicular to the antenna (toward the horizon)
occurs at an antenna length of 0.639 wavelengths. This was worked out
in 1935 by Gihring and Brown, "General Considerations of Tower Antennas
for Broadcast Use", Proceedings of the IRE, vol 23, pp.311-356, April, 1935.

>But, we have to remember for a vertical antenna at given frequency, as the length
>of the radiating element increases the angle of radiation rises. And since it is
such
>a theoretical nightmare to compute real world RF patterns we talk about
theoretical
>perfect situations over perfect grounds and then compare those to the real world
ones
>in the ARRL Antenna Handbook and other such material. I don't know too many Hams
who
>can setup an acre of land with 120 radials spaced equaly around in a circle, seed
the
>ground with the proper amound of rock salt, and do the rest to make as perfect of
>ground as possible (this is suppose to work for Yagi/Quad beams on towers too).
Wish
>I had the place to do this...or is it 100 acres?

Well we broadcasters do, and the angle of maximum radiation does *not*
rise monotonically with increasing length. In fact, starting with a short
antenna, it *decreases* until a length of 0.636 wavelength is reached, and
then increases back toward the short antenna case as length increases further
until it reachs the *same* value at 0.75 wavelength as it had at 0.25
wavelength. Beyond 0.75 wavelength, the pattern breaks into minor lobes
and gain perpendicular to the antenna continues to decrease. A vertical
antenna 0.639 wavelengths in height has the *maximum* broadside gain of

any simple vertical.

Data from _Reference Data for Radio Engineers_, 4th edition, pp.672-673.

>>>It is not true that a 5/8 wave vertical is the highest gain vertical.
>>>What it is is the best compromise for the gain and angle of radiation. As the
>>>vertical element, or any element for that matter, gets longer for a given
>>>wavelength the major lobe/lobes eminating from the antenna start skeewing(sp)
>>>towards the far end of the antenna. This is why long wire antennas several wave
>>>length long at a given frequency are directional antennas. And, why Rhombic
>>>antennas are a combination of this characteristic.
>
>>Well that's almost true anyway. The 5/8 wave vertical over real
>>ground has the best gain perpendicular to it's axis of any *simple*
>>vertical antenna. Stacked and phased sections can have more gain
>>toward the horizon. Really long antennas develop minor lobes and
>>have their power directed in multiple undesired directions.
>Gary
>
>Gary, I agree that stacked dipoles develope more gain than single ones. And
>their radiation pattern is perpendicular to the direction they are setup,
>normally in a vertical configuration although I believe a collinear array
>is an example of horizontally polarized broadside dipole array with stubs
>to bring their patterns into phase and combine to make a higher gain signal.
>(now how is that for a run on sentence). But, on page 8-32 of the 1991 ARRL
>Antenna Handbook they list the theoretical power gain of various 1/2 wavelength
>collinear arrays...
>   '   2 collinear elements---1.6 db
>   3 collinear elements---3.1 db
>   4 collinear elements---4.2 db   '
>   ARRL Antenna Handbook, 16th Edition
>
>On page 8-24 of the same book is listed a 3 element, 1/4 wavelength vertical
array in a line,
>1/2 wavelength appart, each being fed with 3/4 wavelength coax phasing line to
bring them into
>phase. It is not clear weather this is a broadside of end fire (think that is the
correct term)
>array. Gain figures are states as follows...
>
>   '   If the element currents are equal, the resulting pattern has a foward
gain of 5.7 db
>(for lossless elements) ... If the currents are tapered in a binomial coefficient
1:2:1 ratio
>(twice the current in the center element as the two end elements), the gain drops
to 5.2 db, the
>main lobes widen, and the side lobes disappear. ...   '
>   ARRL Antenna Handbook, 16th Edition

>
>
>This seems to indicate that it is possible to get more gain from 1/4 wavelength verticals than
>from 1/2 wavelength elements in a vertical or horizontal pattern. Hum... I would be the first to
>admit antenna theory makes my head spin sometimes but when the ARRL says a 4 element horizontal
>colliniear array has less gain that a 3 element 1/4 wave vertical array, I tend to believe it. I
>may not understand all the wherefores and as such but I tend to believe them.

Yeah, well that's because you're comparing apples and oranges. In the
case of the endfire 3 el array, the horizontal pattern is a figure 8.
In the case of the colinear vertical array, the horizontal pattern is
omni-directional. Both have a compressed vertical pattern, though the
colinear is much more compressed (that's where it gets *all* it's gain).
Compressing the pattern in *two* planes naturally gives more gain than
only compressing it in one, but forms a *directional* vertical antenna
rather than an omni-directional antenna. Apples and oranges. (Note too
that the example colinear has *zero* spacing between elements. That's
the lowest possible gain stacking arrangement. See your Cushcraft 4-pole
numbers for vertical elements stacked with 1/2 wave spacing. Much higher
gain.)

>On page 2-23 of the same text...
>   '   ...An infinitely thin 1/2 wavelength dipole has a theoretical gain of 2.14 db
>over an isotropic radiator (dBi)... '
>   ARRL Antenna Handbook, 16th Edition
>And I know that the thinner the dipole the higher the Q of the resonant circuit, so an "infinitely
>thin" dipole has the highest Q. In other words, the highest gain. This is why a Quagi, quad driven
>element and reflector with dipole directors has more gain theoretically than a quad with the same
>boom length. (I have a love/hate relationship with quads) Higher Q elements.

No. Gain and Q are not directly related. A quad loop has a lower Q
than a dipole element, that's one of it's features, greater bandwidth,
but a 2 el quad has more gain than a 2 el yagi, about the same as a
3 el yagi in fact. That's because a loop has a bigger capture area,
and antenna gain is related to capture area by the following formula

G=(4*pi*A)/L^2

Where G is gain,
A is aperture area,

L is wavelength.

>I haven't been able to find a gain figure for a single 1/4 wavelength vertical in the ARRL Antenna
>Handbook. Looking through the Amateur Radio Supply catolog(Winter 93/94) it is easy to see how gain
> figures vary.
>Having had some experience with Cushcraft antennas and believing they do their homework, I quote
>some of their specs...
>   '   Four Pole Array ... (stacked dipole for VHF/UHF ranges)...
>   AFM-4DA...144-148 (MHz)... Gain, dBd ... (over a dipole) ... 9 Offset(?)...6 Omni...'
>   (page 107)
>   (that is a 4 dipole stacked array with 6 db gain over a dipole...sounds like
>   a bit of difference from the ARRL Handbook figures...4.2 db, so much
>   for homework)

Apples and oranges again. The 4-pole is a 1/2 wave spaced stacked array of halfwave dipole elements while the colinear you chose from the Handbook has *zero* spacing. Halfwave spacing gives a *much* sharper lobe, hence greater gain, than a zero spaced array. What they mean by offset and omni in the 4-pole spec is that the elements can be arranged all on one side of the mast (offset) for 9 dbd gain *in that horizontal direction*, or they can be staggered 90 degrees apart as they go up the pole for 6 dbd *omni* horizontal gain. Actually, this is a crummy antenna, and Cushcraft is always optimistic in their gain figures. A Comet stacked antenna is a better comparison.

Advertised antenna gain figures are generally measured by the marketing department, not the engineering department. That's why QST refuses to print them.

Gary
--
Gary Coffman KE4ZV | You make it, | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | we break it. | uunet!rsiatl!ke4zv!gary
534 Shannon Way | Guaranteed! | emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | |

Date: Sun, 6 Feb 1994 17:54:01 GMT
From: pacbell.com!sgiblab!swrinde!emory!kd4nc!ke4zv!gary@network.ucsd.edu
To: ham-equip@ucsd.edu

References <CKM79r.45H@sunsrvr6.cci.com>, <2ire53$o2g@explorer.clark.net>,
<2iui7p$vm@cascade.ens.tek.com>
Reply-To : gary@ke4zv.atl.ga.us (Gary Coffman)
Subject : Re: Vertical Antennas

In article <2iui7p$vm@cascade.ens.tek.com> t1terryb@cascade.ens.tek.com (Terry
Burge) writes:
>In article <2ip6he$933@cascade.ens.tek.com> t1terryb@cascade.ens.tek.com (Terry
Burge) writes:
>>>Just for the record, I will state it again. A ground plane antenna has higher
>>>gain than a vertical dipole. A quarter wave ground plane has a gain of some-
>>>where around 6 db over isotropic where a dipole has a gain of 2.14 db over
>>>isotropic at it's theoritical best. Gain in an antenna is directly related
>>>to it's RF pattern. I believe the reason a ground plane has more gain than
>>>a vertical dipole is because it has a more concentraited pattern like an
>>>elongated tear drop as opposed to the fat donut shape of a dipole.
[ke4zv]
>>Repeating false statements makes them no less false. A 1/4 wave vertical
>>over a *perfect* groundplane has *exactly* the same gain and pattern as
>>a 1/2 wave vertical. But alas, there are no perfect groundplanes in the
>>real world, so all real 1/4 wave verticals have less gain than 1/2 wave
>>verticals because of losses in the imperfect current mirror.
>
>>> As to weather an R5 or R7 are vetical dipoles or half wave verticals,
>>>I am no expert on them. I have never used one. But from everything I have
>>>read about vertical antennas, they must have a ground plane to mimic the
>>>other have of the antenna. Some systems utilize the shield of the coax cut
>>>to a certain length to do this I believe...seems some VHF/UHF antennas lend
>>>themselves to this. Other than that, ground rods would help as would sea water
>>>too.
[ke4zv]
>>A 1/2 wave antenna, it doesn't matter if it's fed in the middle or from
>>the end, doesn't require a current mirror, so it doesn't require a groundplane
>>or any other connection to ground. It's a resonant structure by itself,
>>there is no "other half" required. On the other hand, a 1/4 wave vertical
>>is self-resonant at *twice* the design frequency in the absence of a current
>>mirroring groundplane. So it must have a groundplane to function as a 1/4
>>wave vertical antenna at the design frequency.
>
>>> It is true that a half wave vertical has more gain than a 1/4 wave
>>>vertical.
[ke4zv]
>>What? You just stated otherwise above. Make up your mind.
>
>No I didn't, I said Half Wave Vertical, not dipole. You are the one who said
>there is no differance in gain weather it is fed in the middle or at the end.

That's right, because there *is* no difference in radiation pattern, and

hence forward gain. The only effect of feedpoint placement is different impedances presented to the transmission line, a non-issue with proper matching networks.

The relevant power formulas for isotropic (theoretical) and actual 1/2 wave radiatiors are

Isotropic P=Pt/(4*pi*R^2)

halfwave P=1.64*Pt/(4*pi*R^2)

Pt is transmitted power in watts
R is the perpendicular distance from the radiator in meters.

There is *no* distinction as to feed point placement.

End of Ham-Equip Digest V94 #25
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